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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/941,533

08/29/2001

Ammar Derraa

MTI-31533

4578

31870

7590

08/17/2004

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EXAMINER

FOURSON III, GEORGE R

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 08/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/941,533

Applicant(s)

DERRAA, AMMAR

Examiner

George Fourson

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-73 and 101-129 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-73 and 101-129 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/8/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Claims 1-3,6-10,35,101,106 and 112 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection is maintained as stated in the paper mailed 2/4/04.

Applicant provides no response to the rejection.

Claims 1,2,3-9,11,12,13,14,16,17,18,19,21,22,23,24,26,27,28,30,31,33,34,35,37,38,40-45,49,68,71,101-105,112,114,116,120 and 121 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al in view of Hu et al.

The rejection is maintained as stated in the paper mailed 2/4/04.

Applicant is incorrect in the assumption that the examiner meant "decreased" film stress. The teachings of the reference would lead one of ordinary skill in the art to expect an increase in film stress in the event that the recited temperature range is employed. The reference expresses a preference for the lower temperature range and the associated lower film stress rather than teaching that the lower range is necessary or that the recited range is inoperable.

Applicant is incorrect in asserting that the rejection is based on disclosure of a plasma treatment temperature of 700°C or greater. The rejection is instead based on the argument that one of ordinary skill in the art would have been led to the recited range through routine experimentation in view of the disclosed goals of the references such as reduced Cl content.

Applicant argues that the examiner simplifies and mischaracterizes the purpose of Wang's process. However, applicant's characterization is unduly narrow. The reference is directed to forming a conformal TiN layer for a contact. The reference teaches that film thickness and treatment temperature affect the properties of the film, expressing a preference for temperatures lower than the recited range. It is noted that the claims are open to films thinner than those exhibiting benefit from the lower temperatures.

Applicant argues that the process of the combination requires heating and cooling between the plasma treatment and deposition steps thereby reducing motivation to combine the teachings of the references. However, the increased complexity associated with heating and cooling steps would be weighed against advantages associated with use of the steps to determine whether the process would be modified as argued by the examiner in the rejection.

Claim 115 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al in combination with Hu et al as applied to claims 1,2,3-9,11,12,13,14,16,17,18,19,21,22,23,24,26,27, 28,30,31,33,34,35,37,38,40-45,49,68,71,101-105,112,114,116,120 and 121 above, and further in view of Leem or Japan 5-267220.

The rejection is maintained as stated in the paper mailed 2/4/04.

Applicant argues that there is no disclosure in Wang et al or Hu et al related to use of boron-doped titanium nitride. However, neither of the references is alleged to contain such a teaching. Leem or Japan '220 are relied on as providing motivation to incorporate boron in the TiN material of Wang et al in view of Hu et al.

Claims 10,15,20,25,29,32,39,50,51-59,61,62,63,67,66,69,70,73,106,107,108,109,72,110,111, 113,117,118,119,122,123,128 and 129 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al in combination with Hu et al as applied to claims 1,2,3-9,11,12,13,14,16,17,18,19,21,22,23,24,26,27, 28,30,31,34,35,37,38,40-45,49,68,71,101-105,112,114,116,120 and 121 above, and further in view of Leem or Japan '220.

The rejection is maintained as stated in the paper mailed 2/4/04.

Claims 36,46,47,48,64 and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al in view of Hu et al as applied to claims 1,2,3-9,11,12,13,14,16,17,18,19,21,22,23,24,26,27, 28,30,31,33,34,35,37,38,40-45,49,68,71,101-105,112,114,116,120 and 121 above, and further in view of Doan et al.

The rejection is maintained as stated in the paper mailed 2/4/04.

Claims 60,124,125,126 and 127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al as applied to claims 1,2,3-9,11,12,13,14,16,17,18,19,21,22,23,24,26,27, 28,30,31,33,34,35,37,38,40-45,49,68,71,101-105,112,114,116,120 and 121 above, and further in view of AAPA.

The rejection is maintained as stated in the paper mailed 2/4/04.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yokoyama 4897709 cited by applicant discloses formation of TiN at 200-900°C (col.4, lines 54+). Eichman

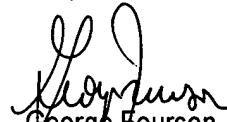
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5279857, cited by applicant, teaches thermal anneal at 600-700°C (col.3). Both of Japan 10-172924 and 10-223563, cited by applicant, disclose reducing Cl content in a TiN film.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (571) 272-2800. See MPEP 203.08.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner George Fourson whose telephone number is (571)272-1860. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571)272-1855. The fax number for this group is (571)273-0224 and the customer service number for group 2800 is 571-272-2815. Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.


George Fourson
Primary Examiner
Art Unit 2823

GFourson
August 16, 2004